UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,919	12/20/2001	Masaru Seita	51343	9973

21874 7590 10/21/2003

EDWARDS & ANGELL, LLP
P.O. BOX 9169
BOSTON, MA 02209

EXAMINER	
WONG, EDNA	

ART UNIT	PAPER NUMBER
1753	15

DATE MAILED: 10/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/027,919	Applicant(s) SEITA ET AL.	
	Examiner Edna Wong	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 October 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-8,10,11 and 13-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-8,10,11 and 13-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 6, 2003 has been entered.

This is in response to the Amendment dated October 6, 2003. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Plating Solution

I. Claims **1-3, 5, 13 and 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Eckles** (US Patent No. 4,384,930) in combination with **Okinaka et al.** (US Patent No. 4,469,564).

Eckles teaches an electrolytic copper plating solution comprising:

(a) copper (= copper sulfate) [col. 13, Example 15];

(b) water (= aqueous) [col. 3, lines 39-45];

(c) a water-soluble chlorine compound (= chloride ions) [col. 18, claim 26]; and

(d) a thiol-reactive compound (= aliphatic aldehydes, an aliphatic ketones and/or carboxylic acids) [col. 5, lines 19-68].

The thiol-reactive compound is present in the electrolytic copper plating solution in an amount from $1.0x10^{-4}$ to $1.0x10^{-1}$ mol/liter (= up to about 25 g/l) [col. 5, lines 19-30].

The aliphatic aldehyde is formaldehyde or acetaldehyde (col. 5, lines 22-27).

The copper comprises copper sulfate (col. 13, Example 15).

Eckles does not teach wherein the electrolytic copper plating solution comprises a brightening agent compound having the structure represented by the formula of -X-S-Y-; wherein -X-S-Y- is $M\text{-}SO_3\text{-}(CH_2)_a\text{-}S\text{-}S\text{-}(CH_2)_b\text{-}SO_3\text{-}M$ (from claim 2); and wherein the electrolytic copper plating solution contains 0.1 to 100 mg/l of the compound having the structure represented by the formula -X-S-Y-.

However, Okinaka teaches that sulfide additives are used to increase the ductility of the deposited copper (col. 6, lines 3-25).

Thus, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one skilled in the art would have been motivated to have modified the electrolytic copper plating solution of Eckles with wherein the electrolytic copper plating solution comprises a compound having the structure represented by the formula of -X-S-Y- because Eckles teaches that other additives can be included in the acid plating baths of his invention, such as brighteners, buffering agents, levelers, wetting agents, etc. *which are intended to improve the performance or life of the bath, the quality of the metal deposit and/or to impart other beneficial effects*. It is common in the electroplating art to utilize many and various additives which are selected according to the particular system being used, including the type of metal to be deposited (col. 3, lines 27-35; and col. 3, line 61 to col. 4, line 5).

Adding a compound having the structure represented by the formula of -X-S-Y- would have increase the ductility of the deposited copper as taught by Okinaka (col. 6, lines 3-25). Thus, improving the quality of the metal deposit.

Although Okinaka does not teach that a compound having the structure represented by the formula of -X-S-Y- is a brightening agent compound, it has been held that a newly discovered use or function of components does not necessarily mean the system is unobvious since this use or function may be inherent in the prior art. *Ex parte Pfeiffer* 135 USPQ 31.

As to wherein -X-S-Y- is M-SO_3-$(CH_2)_a$-S-S-$(CH_2)_b$-SO_3-M (from claim 2),

Okinaka teaches an organic polysulfide of HSO_3-$(CH_2)_3$-S-S-$(CH_2)_3$-SO_3H (col. 6, lines 3-25).

As to wherein the electrolytic copper plating solution contains 0.1 to 100 mg/l of the compound having the structure represented by the formula -X-S-Y-, Okinaka teaches an organic polysulfide concentration between 0.0005 and 1 g/l (col. 6, lines 14-15).

II. Claim **14** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Eckles** (US Patent No. 4,384,930) in combination with **Okinaka et al.** (US Patent No. 4,469,564) as applied to claims 1-3, 5, 13 and15 above, and further in view of **Uzoh et al.** (US Patent No. 6,355,153).

Eckles and Okinaka are as applied above and incorporated herein.

Eckles does not teach wherein the peroxo acids are chosen from performic acid, peracetic acid, peroxypropionic acid, peroxybutanoic acid and peroxypentanoic acid.

However, Uzoh teaches that inorganic and organic peroxides as metal oxidizing agents in an electrolytic copper plating solution (col. 9, lines 45-59).

Thus, the invention as a whole would have been obvious to one having ordinary

skill in the art at the time the invention was made because one skilled in the art would have been motivated to have modified the electrolytic copper plating solution of Eckles with wherein the peroxo acids are chosen from performic acid, peracetic acid, peroxypropionic acid, peroxybutanoic acid and peroxypentanoic acid because Eckles teaches that other additives can be included in the acid plating baths of his invention, such as brighteners, buffering agents, levelers, wetting agents, etc. *which are intended to improve the performance or life of the bath, the quality of the metal deposit and/or to impart other beneficial effects*. It is common in the electroplating art to utilize many and various additives which are selected according to the particular system being used, including the type of metal to be deposited (col. 3, lines 27-35; and col. 3, line 61 to col. 4, line 5).

Inorganic and organic peroxides are conventionally added as metal oxidizing agents in electrolytic copper plating solutions as taught by Uzoh (col. 9, lines 45-59). Thus, intended to impart other beneficial effects.

Process

III. Claims **6-8, 16 and 18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Eckles** (US Patent No. 4,384,930) in combination with **Okinaka et al.** (US Patent No. 4,469,564).

Eckles teaches a process for electrolytic copper plating layer to a substrate comprising the step of:

contacting the substrate (= Hull cell panel) [col. 13, Example 15] with the electrolytic copper plating solution of claim 1 (see Roman Numeral I above).

Eckles does not teach applying an anodic current density of 0.1 to 10 A/dm^2; wherein the substrate is a printed wiring board or a wafer; and wherein the substrate has a through hole or a via hole.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one skilled in the art would have been motivated to have modified the process of Eckles by applying an anodic current density of 0.1 to 10 A/dm^2 because the anodic current density is a result-effective variable and one skilled in the art has the skill to calculate the current density range that would determine the success of the desired reaction to occur, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).

Furthermore, Eckles teaches a current density of from below 0.3 A/dm^2 to above 12 A/dm^2 (col. 10, lines 60-63) and from between about 2.0 A/dm^2 to about 20 A/dm^2 (col. 13, lines 50-54).

As to wherein the substrate is a printed wiring board or a wafer; and wherein the substrate has a through hole or a via hole, it is conventional in the art to electroplate copper onto a printed wiring board or a wafer, wherein the board or wafer has a through

hole or a via hole. The substrate does not appear to significantly change the process since the electrolytic copper plating solution would have electroplated such.

Furthermore, a wafer appear to be an obvious design modification in which a person of ordinary skill in the art would have found to be obvious because the particular configuration does not appear to be significant because the shape would not have affected the overall method of Eckles since the process would have still functioned for its purpose, regardless of its shape, absent evidence to the contrary.

IV. Claim **17** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Eckles** (US Patent No. 4,384,930) in combination with **Okinaka et al.** (US Patent No. 4,469,564) as applied to claims 6-8, 16 and 18 above, and further in view of **Uzoh et al.** (US Patent No. 6,355,153).

Eckles and Okinaka are as applied above and incorporated herein.

Eckles does not teach wherein the peroxo acids are chosen from performic acid, peracetic acid, peroxypropionic acid, peroxybutanoic acid and peroxypentanoic acid.

However, Uzoh teaches that inorganic and organic peroxides as metal oxidizing agents in an electrolytic copper plating solution (col. 9, lines 45-59).

Thus, the invention as a whole would have been obvious to one having ordinary

skill in the art at the time the invention was made because one skilled in the art would have been motivated to have modified the electrolytic copper plating solution of Eckles with wherein the peroxo acids are chosen from performic acid, peracetic acid, peroxypropionic acid, peroxybutanoic acid and peroxypentanoic acid because Eckles teaches that other additives can be included in the acid plating baths of his invention, such as brighteners, buffering agents, levelers, wetting agents, etc. *which are intended to improve the performance or life of the bath, the quality of the metal deposit and/or to impart other beneficial effects*. It is common in the electroplating art to utilize many and various additives which are selected according to the particular system being used, including the type of metal to be deposited (col. 3, lines 27-35; and col. 3, line 61 to col. 4, line 5).

Inorganic and organic peroxides are conventionally added as metal oxidizing agents in electrolytic copper plating solutions as taught by Uzoh (col. 9, lines 45-59). Thus, intended to impart other beneficial effects.

V. Claims **10-11 and 19** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Eckles** (US Patent No. 4,384,930) in combination with **Okinaka et al.** (US Patent No. 4,469,564).

Eckles teaches a method of controlling an electrolytic copper solution comprising

(i) copper (= copper sulfate) [col. 13, Example 15];

(ii) water (= aqueous) [col. 3, lines 39-45];

(iii) a water-soluble chlorine compound (= chloride ions) [col. 18, claim 26]; and

(iv) a thiol-reactive compound (= aliphatic aldehydes, an aliphatic ketones and/or carboxylic acids) [col. 5, lines 19-68],

comprising the step of:

adding the thiol-reactive compound to the electrolytic copper plating solution (col. 5, lines 19-68).

The aliphatic aldehyde is formaldehyde or acetaldehyde (col. 5, lines 22-27).

Eckles does not teach wherein the electrolytic copper plating solution comprises a brightening agent compound having the structure represented by the formula of -X-S-Y-; wherein -X-S-Y- is $M\text{-}SO_3\text{-}(CH_2)_a\text{-}S\text{-}S\text{-}(CH_2)_b\text{-}SO_3\text{-}M$ (from claim 11); and maintaining a concentration of a compound having $-X\text{-}S^-$ structure equal or less than 1.0 micro mol/l.

However, Okinaka teaches that sulfide additives are used to increase the ductility of the deposited copper (col. 6, lines 3-25).

Thus, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one skilled in the art would have been motivated to have modified the electrolytic copper plating solution of Eckles

with wherein the electrolytic copper plating solution comprises a brightening agent compound having the structure represented by the formula of -X-S-Y- because Eckles teaches that other additives can be included in the acid plating baths of his invention, such as brighteners, buffering agents, levelers, wetting agents, etc. *which are intended to improve the performance or life of the bath, the quality of the metal deposit and/or to impart other beneficial effects*. It is common in the electroplating art to utilize many and various additives which are selected according to the particular system being used, including the type of metal to be deposited (col. 3, lines 27-35; and col. 3, line 61 to col. 4, line 5).

Adding a compound having the structure represented by the formula of -X-S-Y- would have increase the ductility of the deposited copper as taught by Okinaka (col. 6, lines 3-25). Thus, improving the quality of the metal deposit.

Although Okinaka does not teach that a compound having the structure represented by the formula of -X-S-Y- is a brightening agent compound, it has been held that a newly discovered use or function of components does not necessarily mean the system is unobvious since this use or function may be inherent in the prior art. *Ex parte Pfeiffer* 135 USPQ 31..

As to wherein -X-S-Y- is M-SO_3-$(CH_2)_a$-S-S-$(CH_2)_b$-SO_3-M (from claim 11), Okinaka teaches an organic polysulfide of HSO_3-$(CH_2)_3$-S-S-$(CH_2)_3$-SO_3H (col. 6, lines 3-25).

As to maintaining a concentration of a compound having -X-S$^-$ structure equal or less than 1.0 micro mol/l, copper plates of enhanced quality were provided if a brightening agent is employed in a plating solution where the brightening agent has a structure of the active species (HS-R-SO_3) and the dimer (O_3S-R-S-S-R-SO_3).

Thus, the concentration of a compound having -X-S$^-$ structure is a result-effective variable and one skilled in the art has the skill to calculate the concentration that would determine the success of the desired reaction to occur, e.g., brightening, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).

Response to Amendment

Claim Objections

Claims **1, 10, 13-14, 16-17 and 19** have been objected to because of minor informalities.

The objection of claims 1, 10, 13-14, 16-17 and 19 has been withdrawn in view of Applicants' amendment.

Claim Rejections - 35 USC § 112

Claims **1-3, 5-8, 10-11 and 13-19** have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The rejection of claims 1-3, 5-8, 10-11 and 13-19 under 35 U.S.C. 112, second

paragraph, has been withdrawn in view of Applicants' amendment.

Double Patenting

Claims **1-3, 5-8, 10-11, 13, 15-16 and 18-19** have been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims **1-8, 11 and 13-43** of copending Application No. 09/970,271 (Cobley et al.).

The rejection of claims 1-3, 5-8, 10-11, 13, 15-16 and 18-19 under the judicially created doctrine of obviousness-type double patenting has been withdrawn in view of Applicants' Terminal Disclaimer dated October 6, 2003.

Response to Arguments

Applicants state that the Eckles patent neither teaches nor suggests the combination of Applicants' brightening agent with a thiol-reactive compound. In response, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants state that the Okinaka et al. patent fails to recognize the problem of the formation of –X-S$^-$ compounds resulting from the use of these polysulfide

compounds as brightening agents. In response, the failure to recognize the problem of the formation of –X-S$^-$ compounds resulting from the use of these polysulfide compounds as brightening agents do not distinguish the method from the prior art.

Applicants state that the Okinaka patent neither discloses nor suggests the use of thiol-reactive compounds, such as aldehydes, in copper electroplating baths. In response, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants state that there is nothing in Eckles that suggests that ductility of the metal deposit is lacking or in any way needs to be improved. In response, Eckles teaches that other additives can be included in the acid plating baths of his invention, such as brighteners, buffering agents, levelers, wetting agents, etc. *which are intended to improve the performance or life of the bath, the quality of the metal deposit and/or to impart other beneficial effects*. It is common in the electroplating art to utilize many and various additives which are selected according to the particular system being used, including the type of metal to be deposited (col. 3, lines 27-35; and col. 3, line 61 to col. 4, line 5).

Applicants state that if one were to combine Eckles and Okinaka, one would at best use the polysulfide compound of Okinaka as a brightening agent in the bath of Eckles instead of the carbonyl-compounds. In response, it has been held that a newly discovered use or function of components does not necessarily mean the system is unobvious since this use or function may be inherent in the prior art. *Ex parte Pfeiffer* 135 USPQ 31.

Applicants state that neither reference alone or in combination teaches or suggests the reduction of problems in via-filling using a copper plating bath containing a compound of the formula –X-S-Y- by the addition of a thiol-reactive compound to the copper plating bath. In response, the reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Applicants. *In re Linter* 458 F 2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F 2d 688, 16 USPQ 2d 1897 (Fed. Cir. 1990), cert. denied, 500 USPQ 904 (1991); *In re Linter* 458 F 2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F 2d 688, 16 USPQ 2d 1897 (Fed. Cir. 1990), cert. denied, 500 USPQ 904 (1991) and MPEP § 2144.

Applicants state that nothing in Uzoh et al. teaches or suggests the use of thiol-reactive compounds in the plating bath and the combination of a thiol-reactive

compound with a compound of the formula –X-S-Y-. In response, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants state that Uzoh et al. neither teach or suggest the reduction of problems in via-filling using a copper plating bath containing a compound of the formula –X-S-Y- by the addition of a thiol-reactive compound to the copper plating bath. In response, the reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Applicants. *In re Linter* 458 F 2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F 2d 688, 16 USPQ 2d 1897 (Fed. Cir. 1990), cert. denied, 500 USPQ 904 (1991); *In re Linter* 458 F 2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F 2d 688, 16 USPQ 2d 1897 (Fed. Cir. 1990), cert. denied, 500 USPQ 904 (1991) and MPEP § 2144.

Applicants state that if one were to combine Uzoh et al. with a combination of Okinaka and Eckles, one would at best have a plating bath containing the surfactant of Eckles, the polysulfide compound of Okinaka et al. and the metal oxidizing agent of Uzoh et al. In response, it has been held that a newly discovered use or function of

components does not necessarily mean the system is unobvious since this use or function may be inherent in the prior art. *Ex parte Pfeiffer* 135 USPQ 31.

The reason or motivation to modify the reference may often suggest what the inventor has done, but for a different purpose or to solve a different problem. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by the Applicants. *In re Linter* 458 F 2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F 2d 688, 16 USPQ 2d 1897 (Fed. Cir. 1990), cert. denied, 500 USPQ 904 (1991); *In re Linter* 458 F 2d 1013, 173 USPQ 560 (CCPA 1972); *In re Dillon* 919 F 2d 688, 16 USPQ 2d 1897 (Fed. Cir. 1990), cert. denied, 500 USPQ 904 (1991) and MPEP § 2144.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (703) 308-3818. The examiner can normally be reached on Mon-Fri 7:30 am to 5:00 pm, alt. Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1495.

Edna Wong
Primary Examiner
Art Unit 1753

EW
October 20, 2003